

Environmental Product Declaration



Environmental Product Declaration for ready mix concrete products produced by Holcim Ecuador at their Machala facility in El Cambio, Ecuador

ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers concrete products produced by Holcim Ecuador. Declared unit: 1 m3 of concrete
Declaration Owner:	Holcim Ecuador S/N Av. Barcelona y José Rodríguez Bonin, Edif. El Caimán Piso 2 Guayaquil, Ecuador www.holcim.com.ec
Program Operator:	Labeling Sustainability Address, 11670 W Sunset Blvd. City, State, Los Angeles, CA www.labelingsustainability.com/
Product Category Rule:	ISO 21930:2017 Sustainability in Building Construction – Environmental Declaration of Building Products: serves as the core PCR Product Category Rule of Environmental Product Declarations PCR for Concrete serves as the sub-category PCR. PCR Program Operator: NSF International Sub-category PCR review was conducted by: Thomas P. Gloria, Ph. D. of Industrial Ecology Consultants: 35 Bracebridge, Rd., Newton, MA 02459-1728, t.gloria@industrial-ecology.com. Dr. Michael Overcash of Environmental Clarity: 2908 Chipmunk Lane, Raleigh, NC 27607-3117, mrovercash@earthlink.net. Mr. Bill Stough of Sustainable Research Group: PO Box 1684, Grand Rapids, MI 49501-1684, bstough@sustainableresearchgroup.com.
Independent LCA Reviewer and EPD Verifier:	This EPD was independently verified in accordance with ISO 14025 and ISO 21930. The life cycle assessment was independently reviewed in accordance with ISO 14044 and the referenced PCR. Independent verification of the declaration, according to ISO 14025:2006 External Third Party Verifier Denice V. Staaf, Certified 3rd Party Verifier under Labeling Sustainability (www.labelingsustainability.com)
Date of Issue:	22 August 2025
Period of Validity:	5 years; valid until 22 August 2030
EPD Number:	HOECU08222503



STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review on the website, www.labelingsustainability.com. This EPD was independently verified in accordance with ISO 14025:2006 and ISO 21930:2017. The life cycle assessment was independently reviewed in accordance ISO 14044:2006 and the referenced PCR.

EPDs are comparable only if prepared from cradle-to-grave life cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products. This EPD is meant for B2B communication.

DESCRIPTION OF PRODUCT AND SCOPE

This EPD reports on 24 concrete mixes manufactured at the Machala Holcim Ecuador concrete facility in El Cambio, Ecuador.

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-gate study, and therefore, stages extending beyond the plant gate are not included in this LCA. Excluded stages include transportation of the manufactured material to the construction site; on-site construction processes and components; building (infrastructure) use and maintenance; and "end-of-life" effects.

READY MIX CONCRETE DESIGN SUMMARY

The following tables provide a list of the ready mix concrete products considered in this EPD along with key performance parameters.

Table 1: Declared products considered in this environmental product declaration

Mix#	Unique name/ID	Short description	Product type	3 day strength, MPa	28 day strength, MPa	H ₂ O to cement ratio
1	10066863 054.5NS2513001 PAVIMENTO	4.5MPa 28d strength ready mix concrete.	Ready Mix		4.5	Proprietary
2	10077462 06210NS0900033 PERMEABLE Color naranja	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
3	10077462 06210NS0900001 PERMEABLE Gris o sin color	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
4	10064246 01210NS2513001 ESTRUCTURAL	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary

5	10067936 23210NS2513001 ECOPACT	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
6	10077462 06210NS0900033 PERMEABLE Color rojo	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
7	10067946 23210NS1918001 ECOPACT	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
8	10077462 06210NS0900033 PERMEABLE Color Amarillo	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
9	10077462 06210NS0900033 PERMEABLE Color verde	21MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
10	10064247 01240NS2513001 ESTRUCTURAL	24MPa 28d strength ready mix concrete.	Ready Mix		24	Proprietary
11	10067941 23240NS2513001 ECOPACT	24MPa 28d strength ready mix concrete.	Ready Mix		24	Proprietary
12	10067942 23240NS2515001 ECOPACT	24MPa 28d strength ready mix concrete.	Ready Mix		24	Proprietary
13	10078470 23240NS2515001 ECOPACT	24MPa 28d strength ready mix concrete.	Ready Mix		24	Proprietary
14	10067947 23240NS2513001 ECOPACT	24MPa 28d strength ready mix concrete.	Ready Mix		24	Proprietary
15	10064248 01280NS2513001 ESTRUCTURAL	28MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
16	10076511 01280NS2513001 ESTRUCTURAL	28MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
17	10078478 23280NS2510001 ECOPACT	28MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
18	10078478 23280NS2510001 ECOPACT	28MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
19	10084317 27350NS1915001 PISOS T32C	35MPa 28d strength ready mix concrete.	Ready Mix		35	Proprietary
20	10078468 11420NS2513002 ALTA RESISTENCIA	42MPa 28d strength ready mix concrete.	Ready Mix		42	Proprietary

21	10047072 11420NS1913001 ALTA RESISTENCIA	42MPa 28d strength ready mix concrete.	Ready Mix		42	Proprietary
22	10084014 054.53S1913001 PAVIMENTO	4.5MPa 3d strength ready mix concrete.	Ready Mix	4.5		Proprietary
23	10065547 043503S2513001 DYNAMax	35MPa 3d strength ready mix concrete.	Ready Mix	35		Proprietary
24	10083251 044503S1918001 DYNAMax	45MPa 3d strength ready mix concrete.	Ready Mix	45		Proprietary

READY MIX CONCRETE DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each ready mix design considered. Please note that the breakdown has been randomly altered and is therefore only an approximation; this manipulation is to ensure confidentiality.

Table 2: Ready mix concrete composition

Product Components	Raw Material, weight%
Cement	Proprietary
Mineral Additions (River sand and Gravel)	30-60.00
Others	0.01-5.00
Total	100.00

SYSTEM BOUNDARIES

The following figure depicts the cradle-to-gate system boundary considered in this study (ND= Not Defined)

Life Cycle Impacts

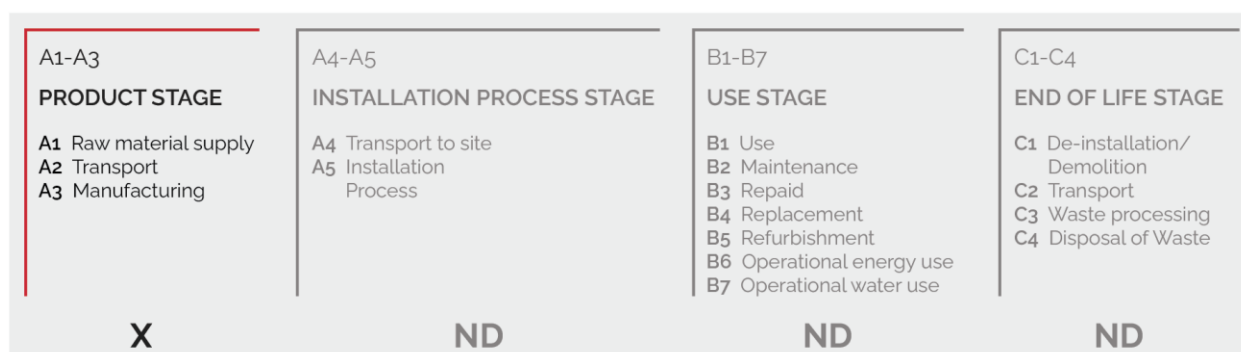


Figure 1: General life cycle phases for consideration in a construction works system

According to the PCR, the following figure illustrates the general activities and input requirements for producing ready mix concrete products and is not necessarily exhaustive.

System Boundary

Raw Material Supply (A1)	Transport (A2)	Manufacturing (A3)
Cements & SCMs Aggregates Admixtures Batch Water Fibers & Pigments	Truck, Rail, Ship Energy Carriers (fuels)	Energy Carriers (electricity and fuels) Ancillary Materials (lubricants, motor oil, cleaning chemicals, other consumables) Water (manufacturing water, including wash water for cement trucks, but excluding batch water) Waste (end of life treatment of ancillary materials and any packaging) 30% total fleet energy transit mix plants only

Figure 2: General system inputs considered in the product system and categorized by modules in scope

All operating data is formulated using the actual data from Holcim Ecuador's plant at the above location, including water, energy consumption and waste generation. All inputs for this system boundary are calculated for the plant.

This life cycle inventory was organized in a LCA spreadsheet and was then input into LCA.no EPD generator. Primary data were utilized. Explanations of the contribution of each data source to this study are outlined in the section "Data Sources and Quality".

Allocation procedures shall be uniformly applied to similar inputs and outputs of the system under consideration. Whenever possible allocation can be avoided as per ISO 14044:2006, Section, 4.3.4.2. This subcategory PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, and post-consumer gypsum as recovered materials. Thus, the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a cement material input.

CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR requires the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above as follows. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the total of the neglected inputs does not exceed 5%.

DATA SOURCES AND DATA QUALITY ASSESSMENT

Table 3: LCI inputs assumed for module A1 (i.e., raw material supply)

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Water	tap water production, conventional	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3

	treatment/tap water/RoW/kg								
Limestone gravel	limestone quarry operation/limestone, unprocessed/RoW/kg ; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
Additives	chemical production, organic/chemical, organic/GLO/kg	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
Inorganic chemical	chemical production, inorganic/chemical, inorganic/GLO/kg	ecoinvent v3.10 in 2024	Antioquia	2024	2	3	1	3	3
River sand	sand quarry operation, extraction from river bed/sand/BR/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
HE Cement	HE Cement	Program Operator: Labeling Sustainability- EPD ID: e717da92-6eee-4fdb-b7d3-acfac1d3dfo1	Guayas	29 November 2022	3	3	3	3	3
GU Cement	GU Cement	Program Operator: Labeling Sustainability- EPD ID: e717da92-6eee-4fdb-b7d3-acfac1d3dfo1	Guayas	29 November 2022	3	3	3	3	3

LIMITATIONS

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Further, LCA offers a wide array of environmental impact indicators, and this EPD reports a collection of those, as specified by the PCR.

In addition to the impact results, this EPD provides several metrics related to resource consumption and waste generation. While these data may be informational in other ways, they do not provide a measure of impact on the environment.

TOTAL IMPACT SUMMARY

The following table reports the total LCA results for each product produced at the given ready mix concrete facility on a per 1m³ of concrete basis.

It should be noted that emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in any of the following categories.

Table 4: **Total life cycle (across modules in scope) impact results for Mix designs, assuming the geometric mean point values on a per 1 m³ of concrete basis**

a) Midpoint Impact Categories

Indicator/LCI Metric	Strength, MPa		GWP ₁₀₀	ODP	AP	EP	SFP	ADP _{fossil}
Unit	3 days	28 days	kg CO ₂ -eq	kg CFC-11-eq	kg SO ₂ -eq	kg N-eq	kg O ₃ -eq	MJ
10066863 054.5NS2513001 PAVIMENTO		4.5	301.73	2.38E-06	0.3651	1.3876	7.2627	1130.804
10077462 06210NS0900033 PERMEABLE Color naranja		21	290.31	2.56E-06	0.4832	1.3107	7.7927	1233.696
10077462 06210NS0900001 PERMEABLE Gris o sin color		21	266.8	2.06E-06	0.3327	1.2148	6.5562	970.9879
10064246 01210NS2513001 ESTRUCTURAL		21	218.66	1.82E-06	0.3026	0.9896	6.3415	903.1711
10067936 23210NS2513001 ECOPACT		21	184.76	1.76E-06	0.3123	0.9804	6.243	900.0102
10077462 06210NS0900033 PERMEABLE Color rojo		21	290.2	2.56E-06	0.4826	1.3103	7.787	1232.498
10067946 23210NS1918001 ECOPACT		21	206.97	1.94E-06	0.3351	1.1125	6.5424	977.9254
10077462 06210NS0900033 PERMEABLE Color Amarillo		21	290.2	2.56E-06	0.4826	1.3103	7.787	1232.498
10077462 06210NS0900033 PERMEABLE Color verde		21	290	2.56E-06	0.483	1.31	7.79	1230

10064247 01240NS2513001 ESTRUCTURAL		24	231.43	1.88E-06	0.3138	1.0638	6.3771	907.4956
10067941 23240NS2513001 ECOPACT		24	202.4	1.91E-06	0.3277	1.0733	6.5052	968.3967
10067942 23240NS2515001 ECOPACT		24	192.33	1.82E-06	0.3219	1.0433	6.2545	911.2632
10078470 23240NS2515001 ECOPACT		24	187.4	1.79E-06	0.3142	1.0016	6.2393	910.5135
10067947 23240NS2513001 ECOPACT		24	204.43	1.94E-06	0.3341	1.1046	6.5201	976.4018
10064248 01280NS2513001 ESTRUCTURAL		28	247.34	2.00E-06	0.323	1.1359	6.55	963.0723
10076511 01280NS2513001 ESTRUCTURAL		28	256.51	2.05E-06	0.3266	1.167	6.6528	986.0133
10078478 23280NS2510001 ECOPACT		28	207.79	1.95E-06	0.3349	1.1104	6.5869	988.032
10078478 23280NS2510001 ECOPACT		28	207.79	1.95E-06	0.3349	1.1104	6.5869	988.032
10084317 27350NS1915001 PISOS T32C		35	301.48	2.31E-06	0.361	1.4094	6.9242	1064.649
10078468 11420NS2513002 ALTA RESISTENCIA		42	321.75	2.47E-06	0.3771	1.5008	7.249	1145.124
10047072 11420NS1913001 ALTA RESISTENCIA		42	261.96	2.24E-06	0.3701	1.3762	7.0121	1088.137
10084014 054.53S1913001 PAVIMENTO	4.5		336.22	2.67E-06	0.3981	1.5869	7.6819	1254.776
10065547 043503S2513001 DYNAMax	35		376.8	2.84E-06	0.4166	1.7481	7.9223	1300.471
10083251 044503S1918001 DYNAMax	45		342.62	2.66E-06	0.4053	1.6268	7.654	1225.982

b) Resource Inventory Metrics

Indicator/LCI Metric	Strength, MPa		RPRE	PRM	NRPRE	NRPRM	SM	RSF	RE	FW
Unit	3 days	28 days	MJ	MJ	MJ	kg	MJ	MJ	MJ	m3
10066863 0545NS2513001 PAVIMENTO		4.5	256.13	0.97	1083.91	46.97	11.57	0.026	0.142	0.927
10077462 06210NS0900033 PERMEABLE Color naranja		21	250.01	0.93	1200.68	33.12	10.30	0.026	0.126	1.064
10077462 06210NS0900001 PERMEABLE Gris o sin color		21	228.45	0.93	937.95	33.12	10.30	0.023	0.126	0.625
10064246 01210NS2513001 ESTRUCTURAL		21	184.76	0.86	865.53	37.71	8.10	0.021	0.099	0.799
10067936 23210NS2513001 ECOPACT		21	175.33	0.80	844.04	56.03	6.66	0.020	0.079	0.796
10077462 06210NS0900033 PERMEABLE Color rojo		21	249.91	0.93	1199.48	33.12	10.30	0.026	0.126	1.062
10067946 23210NS1918001 ECOPACT		21	197.15	0.83	914.32	63.67	7.57	0.021	0.090	0.833
10077462 06210NS0900033 PERMEABLE Color Amarillo		21	249.91	0.93	1199.48	33.12	10.30	0.026	0.126	1.062
10077462 06210NS0900033 PERMEABLE Color verde		21	250.00	0.93	1200.00	33.10	10.30	0.026	0.126	1.060
10064247 01240NS2513001 ESTRUCTURAL		24	197.55	0.88	867.83	39.73	8.75	0.022	0.107	0.732
10067941 23240NS2513001 ECOPACT		24	191.75	0.82	909.30	59.17	7.35	0.021	0.087	0.870
10067942 23240NS2515001 ECOPACT		24	184.39	0.81	848.99	62.35	7.05	0.020	0.083	0.745
10078470 23240NS2515001 ECOPACT		24	178.14	0.80	851.56	59.02	6.77	0.020	0.080	0.806

10067947 23240NS2513001 ECOPACT		24	194.68	0.83	910.31	66.17	7.46	0.021	0.088	0.825
10064248 01280NS2513001 ESTRUCTURAL		28	210.54	0.90	921.38	41.76	9.37	0.023	0.115	0.807
10076511 01280NS2513001 ESTRUCTURAL		28	217.89	0.91	947.79	38.28	9.73	0.023	0.119	0.860
10078478 23280NS2510001 ECOPACT		28	197.27	0.83	925.42	62.68	7.57	0.021	0.090	0.866
10078478 23280NS2510001 ECOPACT		28	197.27	0.83	925.42	62.68	7.57	0.021	0.090	0.866
10084317 27350NS1915001 PISOS T32C		35	259.51	0.98	1017.65	47.08	11.79	0.025	0.144	0.787
10078468 11420NS2513002 ALTA RESISTENCIA		42	275.69	1.01	1094.79	50.41	12.55	0.026	0.154	0.878
10047072 11420NS1913001 ALTA RESISTENCIA		42	251.77	0.91	1037.40	50.81	9.98	0.024	0.118	0.999
10084014 054.53S1913001 PAVIMENTO	4.5		286.17	1.02	1188.94	65.92	12.97	0.028	0.159	0.934
10065547 043503S2513001 DYNAMax	35		322.03	1.08	1249.03	51.52	14.81	0.030	0.181	0.998
10083251 044503S1918001 DYNAMax	45		293.91	1.03	1162.13	63.94	13.40	0.028	0.164	0.809

c) Waste/output Inventory Metrics

Indicator/LCI Metric	Strength, MPa		HWD	NHWD	HLRW	MR	MER
Unit	3 days	28 days	kg	kg	kg	kg	kg
10066863 054.5NS2513001 PAVIMENTO		4.5	19.902	65.636	0.001	0.001	0.059
10077462 06210NS0900033 PERMEABLE Color naranja		21	20.427	124.548	0.002	0.001	0.053
10077462 06210NS0900001 PERMEABLE Gris o sin color		21	17.655	56.881	0.001	0.001	0.053

10064246 01210NS2513001 ESTRUCTURAL		21	14.127	50.161	0.001	0.001	0.041
10067936 23210NS2513001 ECOPACT		21	12.022	59.53	0.001	0	0.042
10077462 06210NS0900033 PERMEABLE Color rojo		21	20.414	124.24	0.002	0.001	0.053
10067946 23210NS1918001 ECOPACT		21	13.608	66.268	0.001	0	0.048
10077462 06210NS0900033 PERMEABLE Color Amarillo		21	20.414	124.24	0.002	0.001	0.053
10077462 06210NS0900033 PERMEABLE Color verde		21	20.4	124	0.002	0.001	0.053
10064247 01240NS2513001 ESTRUCTURAL		24	15.17	52.393	0.001	0.001	0.045
10067941 23240NS2513001 ECOPACT		24	13.205	64.29	0.001	0	0.046
10067942 23240NS2515001 ECOPACT		24	12.69	62.514	0.001	0	0.044
10078470 23240NS2515001 ECOPACT		24	12.23	60.714	0.001	0	0.043
10067947 23240NS2513001 ECOPACT		24	13.437	66.185	0.001	0	0.047
10064248 01280NS2513001 ESTRUCTURAL		28	16.217	55.467	0.001	0.001	0.048
10076511 01280NS2513001 ESTRUCTURAL		28	16.799	56.264	0.001	0.001	0.05
10078478 23280NS2510001 ECOPACT		28	13.612	66.273	0.001	0	0.048
10078478 23280NS2510001 ECOPACT		28	13.612	66.273	0.001	0	0.048
10084317 27350NS1915001 PISOS T32C		35	20.184	64.92	0.001	0.001	0.06

10078468 11420NS2513002 ALTA RESISTENCIA		42	21.492	69.148	0.002	0.001	0.064
10047072 11420NS1913001 ALTA RESISTENCIA		42	17.475	76.242	0.001	0	0.063
10084014 054.53S1913001 PAVIMENTO	4.5		22.367	75.174	0.002	0.001	0.066
10065547 043503S2513001 DYNAMax	35		25.227	78.47	0.002	0.001	0.076
10083251 044503S1918001 DYNAMax	45		22.997	75.443	0.002	0.001	0.068